

WHAT IS CLAIMED

1        1. A system for providing a retrievable record of  
2 the flight performance of an aircraft comprising:

3        a first data store which is coupled to a digital  
4 flight data acquisition unit of said aircraft and is  
5 operative to store aircraft flight data information  
6 supplied thereby; and

7        a first transceiver, coupled to said first data store,  
8 and being operative to download said aircraft flight data  
9 via a first, radio frequency (RF) communication link to a  
10 second transceiver at an airfield.

1        2. A system according to claim 1, further including  
2 a second communication link coupled to convey downloaded  
3 flight data from said aircraft to a base station at said  
4 airfield to a flight operations control center for  
5 analysis.

1        3. A system according to claim 1, wherein said  
2 airfield further includes a wireless router coupling said  
3 first, RF communication link to said base station.

1        4. A system according to claim 1, wherein said  
2 first, RF communication link is a bidirectional RF  
3 communication link.

1 5. A system according to claim 3, wherein said  
2 first, RF communication link occupies a frequency spectrum  
3 that does not require a site use license by the Federal  
4 Communications Commission.

1 6. A system according to claim 3, wherein said  
2 first, RF communication link comprises a spread spectrum  
3 communication link.

1 7. A system according to claim 1, wherein said first  
2 transceiver includes an adaptive power control unit which  
3 is operative to controllably vary the emitted power level  
4 of said first, RF communication link in dependence upon the  
5 geographical location of said second transceiver.

1 8. A system according to claim 2, wherein said  
2 second transceiver is operative to convey information from  
3 said base station over said first, RF communication link to  
4 said first transceiver for delivery to an in-flight utility  
5 subsystem on board said aircraft.

1 9. A system according to claim 2, wherein said  
2 second transceiver is operative to upload video, audio and  
3 flight control data information from said base station over  
4 said first, RF communication link to said first transceiver  
5 for delivery to an in-flight utility subsystem on board  
6 said aircraft.

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1 10. A system according to claim 1, wherein said first  
2 transceiver is operative to download said aircraft flight  
3 data over a first channel portion of said first, RF  
4 communication link to said second transceiver at said  
5 airfield, and wherein said second transceiver is operative  
6 to upload video, audio and flight control data information  
7 over a second channel portion of said first, RF  
8 communication link from a ground subsystem at said airfield  
9 to said first transceiver unit on board said aircraft.

1 11. A system according to claim 1, wherein said first  
2 transceiver is operative to compress said aircraft flight  
3 data and to transmit said compressed aircraft flight data  
4 via said first, RF communication link to said second  
5 transceiver at said airfield.

1 12. A system according to claim 1, wherein said first  
2 transceiver is operative to controllably retransmit said  
3 aircraft flight data via said first, RF communication link  
4 to said second transceiver at said airfield in response to  
5 a ground subsystem at said airfield detecting a prescribed  
6 error content in downloaded aircraft flight data.

1 13. A system according to claim 1, wherein said  
2 second transceiver is operative to perform forward error  
3 correction encoding of information uploaded over said  
4 first, RF communication to said first transceiver on board  
5 said aircraft.

1 14. A system according to claim 1, wherein said  
2 aircraft is provided with a diversity antenna arrangement  
3 to which said first transceiver is coupled.

1 15. A system according to claim 1, wherein a wireless  
2 router at said airfield is provided with a diversity  
3 antenna arrangement to which said second transceiver is  
4 coupled.

1 16. A system according to claim 1, wherein said first  
2 and second transceivers employ a frequency management  
3 mechanism which is operative to tune said first and second  
4 transceivers to selected portion of a frequency spectrum  
5 that does not require a site use license by the Federal  
6 Communications Commission.

1 17. A system according to claim 16, wherein said  
2 frequency management mechanism is operative to tune said  
3 first and second transceivers to said selected portion of  
4 a frequency spectrum that does not require a site use  
5 license by the Federal Communications Commission in  
6 accordance with an assessed quality of said first  
7 communication link.

1 18. A system for providing a retrievable record of  
2 the flight performance of an aircraft, said flight  
3 performance data being supplied by a digital flight data  
4 acquisition unit to a flight data recorder on board said  
5 aircraft, comprising:

6 an auxiliary data store which is coupled to a digital  
7 flight data acquisition unit of said aircraft exclusive of  
8 said flight data recorder and is operative to store said  
9 aircraft flight data information supplied thereby; and

10 a first transceiver, coupled to said first data store,  
11 and being operative to download said aircraft flight data  
12 via a first, RF communication link to a second transceiver  
13 at an airfield-based subsystem.

1 19. A system according to claim 18, wherein said  
2 first, RF communication link comprises a bidirectional  
3 radio frequency carrier-based ground data link through  
4 which said first transceiver is linked to said second  
5 transceiver at said airfield-based subsystem either  
6 directly, or indirectly through a repeater.

1 20. A system according to claim 18, wherein said  
2 wireless ground data link comprises a direct sequence  
3 spread spectrum RF link having a carrier frequency lying  
4 in a frequency spectrum that does not require a site use  
5 license by the Federal Communications Commission.

1 21. A system according to claim 19, wherein said  
2 auxiliary data store is operative to store and distribute  
3 information uploaded via said bidirectional RF  
4 communication link to said aircraft from said airfield-  
5 based subsystem in preparation for flight.

1 22. A system according to claim 21, wherein said  
2 auxiliary data store is operative to store and distribute  
3 information uploaded via said RF communication link to said  
4 aircraft from said airfield-based subsystem in preparation  
5 for flight.

1 23. A system according to claim 22, wherein said  
2 uploaded information includes audio, video and data.

1 24. A system according to claim 22, wherein said  
2 uploaded information includes flight navigation  
3 information, and digitized in-flight passenger service and  
4 entertainment video and audio files.

1 25. A system according to claim 18, further including  
2 an auxiliary printer ported to said auxiliary data store,  
3 so as to enable a copy of flight data information to be  
4 provided to said aircraft's flight crew.

1 26. A system according to claim 18, wherein said  
2 airfield-based subsystem is provided with a plurality of  
3 wireless routers, each having a respective second  
4 transceiver and being operative to communicate via a  
5 respective RF communication link to a first transceiver on  
6 board an aircraft.

1 27. A system according to claim 18, wherein at least  
2 one of said first and second transceivers includes a  
3 plurality of antennas.

1 28. A system according to claim 19, wherein an  
2 airfield-based subsystem transceiver is operative to  
3 subdivide said bidirectional RF communication link into  
4 sub-band channels, and to dynamically assign such sub-band  
5 channels for communications between said aircraft and said  
6 airfield-based subsystem in dependence upon the quality of  
7 available channel links between said airfield-based  
8 subsystem and said aircraft.

1 29. A system according to claim 19, wherein said  
2 first transceiver installed on board said aircraft includes  
3 an error detection source coding system that enables said  
4 second transceiver at said airfield-based subsystem to  
5 detect errors in flight data downloaded at said airfield-  
6 based subsystem, in response to which said second  
7 transceiver at said base station is operative to request a  
8 retransmission from said first transceiver.

1 30. A system according to claim 29, wherein said  
2 second transceiver includes a forward error correction  
3 mechanism to which data conveyed over said RF communication  
4 link is subjected in the course of uploading data from said  
5 airfield-based subsystem to said aircraft.

1 31. A system according to claim 18, wherein said  
2 first transceiver includes an adaptive power control unit  
3 which is operative to controllably adjust the transmitted  
4 power level of data downloaded over said RF communication  
5 link.

1 32. A system according to claim 31, wherein said  
2 adaptive power control unit is operative to controllably  
3 vary the emitted power level of said RF communication link  
4 in dependence upon the geographical location of a wireless  
5 router at said airfield-based subsystem.

1 33. A system according to claim 31, wherein said  
2 adaptive power control unit is operative to increase  
3 transmit power to compensate for impairment in the quality  
4 of said RF communication link.



1 34. A method for providing a retrievable record of  
2 the flight performance of an aircraft comprising the steps  
3 of:

4 (a) storing on board said aircraft flight performance  
5 data supplied by way of a flight data acquisition unit to  
6 which sensors that monitor flight parameters of said  
7 aircraft are coupled; and

8 (b) at the completion of a flight of said aircraft,  
9 transmitting signals representative of the flight  
10 performance data stored in step (a), via an RF  
11 communication link from said aircraft to an airfield-based  
12 subsystem.

1 35. A method according to claim 34, further including  
2 the step of:

3 (c) conveying flight performance data from said  
4 airfield-based subsystem to a flight operations control  
5 center for analysis.

1 36. A method according to claim 34, wherein said RF  
2 communication link comprises a bidirectional RF  
3 communication link.

1 37. A method according to claim 34, wherein said RF  
2 communication link occupies a frequency spectrum that does  
3 not require a site use license by the Federal  
4 Communications Commission.

1 38. A method system according to claim 34, wherein  
2 said RF communication link comprises a spread spectrum  
3 radio frequency communication link.

1 39. A method according to claim 34, wherein step (b)  
2 includes controllably adjusting the emitted power level of  
3 signals transmitted over said RF communication link in  
4 dependence upon the geographical location of a wireless  
5 router of said airfield-based subsystem.

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1 40. A method according to claim 34, further including  
2 the step of:

3 (c) transmitting information signals from said  
4 airfield-based subsystem over said RF communication link to  
5 an in-flight utility subsystem on board said aircraft.

1 41. A method according to claim 40, wherein step (c)  
2 includes transmitting video, audio and flight control data  
3 information signals from said airfield-based subsystem over  
4 said RF communication link to an in-flight utility  
5 subsystem on board said aircraft.

1 42. A method according to claim 34, wherein step (a)  
2 comprises transmitting flight performance data over a first  
3 channel portion of said RF communication link to said  
4 airfield-based subsystem, and further including the step  
5 (c) of transmitting video, audio and flight control data  
6 from said airfield-based subsystem over a second channel  
7 portion of said RF communication link to said aircraft.

1 43. A method according to claim 34, wherein step (a)  
2 further comprises compressing said aircraft flight  
3 performance data, and wherein step (b) comprises encrypting  
4 and transmitting said compressed aircraft flight  
5 performance data via said RF communication link to said  
6 airfield-based subsystem.

1 44. A method according to claim 34, further including  
2 the steps of:  
3

4 (c) at said airfield-based subsystem, monitoring  
5 signals representative of the flight performance data  
6 transmitted in step (b) for the presence of errors; and

7 (d) in response to step (c) detecting a prescribed  
8 error content in said monitored signals representative of  
9 aircraft flight performance data, causing the  
10 retransmission of signals representative of flight  
performance data stored in step (a).

1 45. A method according to claim 40, wherein step (c)  
2 includes performing forward error correction encoding of  
3 information signals transmitted from said airfield-based  
4 subsystem over said RF communication link to said in-flight  
5 utility subsystem on board said aircraft.

1 46. A method according to claim 34, wherein step (b)  
2 includes receiving said signals representative of the  
3 flight performance data stored in step (a) by way of a  
4 diversity antenna arrangement at said airfield-based  
5 subsystem.

1 47. A method according to claim 40, wherein step (c)  
2 includes receiving information signals from said airfield-  
3 based subsystem transmitted over said RF communication link  
4 by way of a diversity antenna arrangement provided on said  
5 aircraft.

1 48. A method according to claim 40, further including  
2 the step (d) of subdividing said RF communication link into  
3 sub-band channels, and dynamically assigning such sub-band  
4 channels for the transmission of signals in steps (b) and  
5 (c) based upon the quality of available channels between  
6 said airfield-based subsystem and said aircraft.

1 49. A method according to claim 34, further including  
2 the step of:

3 (c) causing at least a portion of said flight  
4 performance data stored in step (a) to be printed out to  
5 said aircraft's flight crew.

1 50. A method according to claim 49, wherein step (c)  
2 comprises causing at least a portion of said flight  
3 performance data stored in step (a) to be printed out to  
4 said aircraft's flight crew in response to portion of said  
5 flight performance data exceeding flight data parameter  
6 limits.

1 51. A method according to claim 34, wherein said RF  
2 communication link occupies a frequency band of 2.4 - 2.5  
3 GHz.

1 52. A method of communicating between a first site  
2 and a plurality of second sites comprising the steps of:

3 (a) providing a plurality of wireless bidirectional  
4 communication links between said first site and said  
5 plurality of second sites;

6 (b) at said first site, broadcasting a first spread  
7 spectrum signal within an unlicensed frequency band;

8 (c) at a respective second site monitoring said  
9 spread spectrum signal broadcast in step (b) and  
10 transmitting a second spread spectrum signal to said second  
11 site, said second spread spectrum signal having its power  
12 level adjusted in accordance with information contained  
13 within said first spread spectrum signal.

1 53. A method according to claim 52, wherein step (b)  
2 comprises selectively broadcasting said first spread  
3 spectrum signal by way of a selected one of a plurality of  
4 diversity antennas based upon the transmission quality of  
5 a wireless communication link between said respective  
6 second site and said first site.

1 54. A method according to claim 52, wherein step (b)  
2 comprises selectively broadcasting said first spread  
3 spectrum signal by way of a selected sub-band portion of  
4 said unlicensed frequency band, based upon the transmission  
5 quality of a wireless communication link between said  
6 respective second site and said first site.

1 55. A method according to claim 52, wherein step (b)  
2 comprises transmitting video information signals from said  
3 first site over said wireless communication link to said  
4 second site.

1 56. A method according to claim 52, further including  
2 the step (d) of, at said first site, monitoring signals  
3 transmitted from said second site in step (c) for the  
4 presence of errors and, in response to detecting a  
5 prescribed error content in said monitored signals,  
6 requesting retransmission of signals from said second site.

1 57. A method according to claim 52, further including  
2 the step (d) of subdividing said wireless communication  
3 link into sub-band channels, and dynamically assigning such  
4 sub-band channels for the transmission of signals in steps  
5 (b) and (c) based upon the quality of available channels  
6 between said first and second sites.

1 58. A method according to claim 52, wherein said  
2 wireless communication link occupies a frequency band of  
3 2.4 - 2.5 GHz.